IRRITANT CONTACT DERMATITIS

A Summary of the Occupational Health Concern

Canadian Centre for Occupational Health and Safety

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IRRITANT CONTACT DERMATITIS--A SUMMARY OF THE OCCUPATIONAL HEALTH CONCERN

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1. WHAT IS OCCUPATIONAL CONTACT DERMATITIS?

Occupational contact dermatitis is a local inflammation of the skin. The inflammation is caused by substances found in the workplace that come into direct contact with the skin. The inflammation may be caused by irritation or allergy. This document explains irritant contact dermatitis.

2. HOW DOES IRRITANT CONTACT DERMATITIS DEVELOP?

In the workplace, irritant contact dermatitis can develop after short, heavy exposure or prolonged, light exposure to a substance. The appearance of irritant contact dermatitis varies considerably according to the conditions of exposure. For example, an accidental contact with a strong irritant causes immediate blisters. Contact with a mild irritant may only produce redness of the skin. But if the irritation continues, small lesions appear on the reddened area and crusts and scales form. The skin damage heals a few weeks after exposure ends.

The irritant action of a substance depends on its ability to change some properties of the outer layer of the skin which acts as a protective barrier against toxic substances. Among other changes, some substances are able to remove fat or fat-like material and water from the outer layer of the skin. This diminishes the protective action of the skin and increases the ability of irritants to infiltrate the skin. The removal of fat or fat-like material from the skin is also responsible for the dryness, cracking and whitening of the skin.

To produce the damage, the substance must infiltrate the outer layer of the skin. Following infiltration, the substance comes into contact with cells and tissues. The substance also reacts with certain natural chemicals present in cells and tissues. These reactions produce skin damage. But cells and tissues try to repair the damage with a protective response. The protective response involves pain, heat, redness and swelling.

Minimal skin damage, as in the thickening of the inner layer of the skin, will not be visible. But when the damage is severe, the skin shows signs of chapping, scaling, and blistering. Some skin cells also die. Typically, an irritant reaction develops within a few hours from exposure and is at its worst after approximately twenty four hours.

3. WHAT ARE THE CONTRIBUTING FACTORS?

Factors contributing to irritation include the chemical nature of the substance, for example, whether it is an acid, an alkali, or a salt, the amount and concentration that comes into contact with the skin, and the length and frequency of the exposure.

Factors peculiar to individual workers are important. The resistance of the skin increases with age. Hereditary factors influence the variety of reactions seen in different persons when exposed to the same irritant. The region of the body that comes into contact with an irritant substance is important. The penetration of substances varies over different body regions. For example, some substances penetrate the face and the upper back more quickly than the arms.

Environmental factors play a significant role. For example, hot workplaces induce sweating which can dissolve some types of industrial chemical powders, increasing their toxicity for the skin. But sweating may also be a protective function, because it may dilute or wash out substances. Low humidity and moisture can cause chapping of the skin, increasing the possibility of irritation. Friction against the skin, occurring while operating grinding machines and other equipment can scrape away the skin, diminishing its protective action against irritants. Clothing soaked with irritants is another important factor. The presence of cuts or skin injuries into which irritant substances can enter also contributes to the development of irritant contact dermatitis. Table 1 summarizes some of the contributing factors.

Table 1 - Factors contributing to the development of skin irritation

Related to Substance	Related to Person	Related to Environment
chemical nature	region of skin	temperature
solubility	length of exposure	humidity, moisture,
form: gas, liquid, solid	dryness	barometric pressure
concentration	sweating	friction
	age	contamination of clothing
	genetic background	cuts

4. WHAT OCCUPATIONS ARE AT RISK?

Some of the occupations where irritant contact dermatitis has been seen are listed in Table 2. Some occupational substances which can cause irritant contact dermatitis may not be listed. New materials and new processes introduce new exposures and create new risks.

Table 2 - Irritants encountered in various occupations

Occupation	Irritant
Agriculture workers	Artificial fertilizers, disinfectants, cleaners, petrol and diesel oil
Artists	Solvents, clay, plaster
Automobile and aircraft industry workers	Solvents, cutting oils, paints hand cleansers
Bakers and confectioners	Flour, detergents
Bartenders	Detergents, wet work
Bookbinders	Solvents, glues
Butchers	Detergents, meat, waste
Cabinet makers, and carpenters	Glues, detergents, thinners, solvents, wood preservatives
Cleaners	Detergents, solvents, wet work
Coal miners	Dust (coal, stone), cement, wet conditions
Construction workers	Cement
Cooks and caterers	Detergents, vegetable juices, wet work
Dentists and dental technicians	Detergents, hand cleansers, wet work
Dry cleaners	Solvents
Electricians	Soldering fluxes
Electroplaters	Acids, alkalis
Floor-layers	Solvents
Florists and gardeners	Manure, artificial fertilizers, pesticides, wet work
Hairdressers	Permanent wave solutions, shampoos, bleaching agents, wet work
Hospital workers	Detergents, disinfectants, food, wet work
Homemakers	Detergents, cleansers, foods, wet work
Jewellers	Detergents, solvents
Mechanics	Oils, greases, petrol, diesel fuel, cleaners, solvents
Metal workers	Cutting oils, solvents, hand cleansers
Nurses	Disinfectants, detergents, wet work
Office workers	Solvents (photocopiers, adhesives)
Painters	Solvents, thinners, wallpaper adhesives, hand cleansers
Photography industry workers	Solvents, wet work
Plastics workers	Solvents, acids, styrene, oxidizing agents
Printers	Solvents
Rubber workers	Solvents, talc, zinc stearate, uncured rubber
Shoemakers	Solvents
Tannery workers	Acids, alkalis, reducing and oxidizing agents, wet work
Textile workers	Fibres, bleaching agents, solvents
Veterinarians and slaughterhouse workers	Disinfectants, wet work, animal entrails and secretions

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5. HOW IS IT RECOGNIZED?

Victims of irritant contact dermatitis often consult a doctor or nurse. While some experimental tests can provide an indication of the irritant potential of substances, there is no single test that can reliably identify irritants in specific cases. In the evaluation of occupational irritant contact dermatitis, the best approach is to identify the conditions of exposure through a discussion of the victim's employment. The information to be gathered includes a detailed list of all chemicals in the individual's working environment, a detailed description of all processes involved in a day's work, and knowledge of whether other workers are affected.

6. HOW IS IT TREATED?

Contact dermatitis may be treated with compresses, creams, ointments and skin cleansers. In general, the skin should be protected from physical trauma, chemical irritation, excessive sunlight, wind, and rapid temperature changes while the dermatitis is active.

7. HOW COMMON IS IT?

The number of cases of irritant contact dermatitis in Canada at this time is not known. According to some US statistics, skin disorders comprise more than 45 percent of all occupationally related diseases. Among all occupational dermatitis, irritant contact dermatitis accounts for about 80 percent.

8. WHAT ARE THE PREVENTIVE MEASURES?

Occupational irritant contact dermatitis can be avoided by the following measures:

- personal hygiene
- substitution of a less harmful substance
- enclosure of the process
- automation of the work procedures
- local exhaust ventilation systems
- good housekeeping
- education
- protective clothing
- barrier creams, skin cleansers
- convenient washing facilities

Personal hygiene, including hand washing, is of vital importance in preventing contact dermatitis. But workers should be aware that excessive exposure to just water alone produces dryness and irritation of the skin. This effect is even greater with the addition of soap and detergents or after exposure to solvents. For skin cleansing, workers should use the mildest soap. For industrial cleaning they should use the mildest detergent. For removing difficult oil and grease stains on hands and arms, workers should use a waterless hand cleanser. If waterless hand cleansers do not remove difficult stains, abrasive soaps should be used. Waterless hand cleansers and abrasive soaps should be used sparingly and only when necessary.

Engineering control methods include the enclosure of processes to separate workers from the harmful substances with which they work. Local exhaust systems should be used where toxic substances may escape into the workroom. Non-hazardous substances should be substituted for hazardous substances. Even changing the form of the substance may be beneficial. For example, granules are usually less irritating than a fine powder. Good housekeeping includes proper storage of substances, frequent disposal of waste, prompt removal of spills, and maintenance of the equipment to keep it free of dust, dirt and drippings.

Workers should be informed about the nature of substances they are exposed to, and about work processes. Protective clothing such as aprons and gloves should be properly selected. Not all protective clothing resists all substances. Manufacturers' specifications should be followed. Barrier creams are used as substitutes for protective clothing, especially when gloves or sleeves cannot be safely used. But they do not provide as good a protection as protective clothing. Washrooms, toilets, and showers should be conveniently located and supplied with adequate hot water, disposable towels and soap.

Establishing a good program to avoid exposure of the skin to irritant substances is of vital importance in eliminating irritant contact dermatitis.

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